# SALINA, KANSAS

# MUNICIPAL WATER CONSERVATION PLAN

# DROUGHT/EMERGENCY CONTINGENCY

**JULY 31, 2006**

**CITY COMMISSION MEETING**

# Sequence of Events

- Mon July 17
  - Peak City consumption 12.1 MGD
  - Recorded Mean River Flow 19 cfs
- Thur July 20 –
  - Closed flood control gates
  - DWR preliminary assessment
  - Recorded Mean River Flow 9.1 cfs
- Fri July 21
  - Water Watch Declared
  - Recorded Mean River Flow 7.7 cfs
- Wed July 26
  - Water Emergency Declared
  - City Consumption 11.5 MGD
  - Recorded Mean River Fow 3.2 cfs
- Thur July 27
  - City Consumption 7.1 MGD
  - Recorded Mean River Flow 1.3 cfs
- Fri July 28
  - City Consumption 6.1 MGD
  - Recorded Mean River Flow 5.2 cfs
- Sat July 29
  - City Consumption 7.1 MGD
  - Recorded Mean River Flow 6.5 cfs
- Sun July 30
  - City Consumption 6.3 MGD
  - Recorded Mean River Flow 14 cfs
- Mon July 31
  - City Consumption estimated at 6.5 MGD
  - Recorded Mean River Flow 16 cfs

# Salina Water System
# Peak Daily Treatment Capacity

- **Water Treatment Plant Capacity**
  - 20 MGD
- **Groundwater Supply**
  - 15 wells = 10 MGD
- **Surface Water Supply**
  - Smoky Hill River = 10 MGD
- **Contingency Operation**
  - 3 Schilling Wells = 2 MGD

# City Ordinance # 97-9833, October 27, 1997

| MUNICIPAL WATER CONSERVATION PLAN DROUGHT/EMERGENCY CONTINGENCY | | | |
|---|---|---|---|
| **TRIGGER POINTS – STAGE TRIGGERED BY ANY ONE CONDITION** | **STAGE 1 WATER WATCH** | **STAGE 2 WATER WARNING** | **STAGE 3 WATER EMERGENCY** |
| Treatment Plant Operation – For Three Consecutive Days | 75%Capacity (15.0 MGD) or More | 90% Capacity (18.0 MGD) or More | 100% Capacity (20.0 MGD) or More |
| Ground Water Levels – Below Normal Seasonal Level | 5 Feet | 10 Feet | 15 Feet |
| Smoky Hill River Flows Below cfs at Mentor Gage | 45 cfs | 30 cfs | 15 cfs |

Emergency

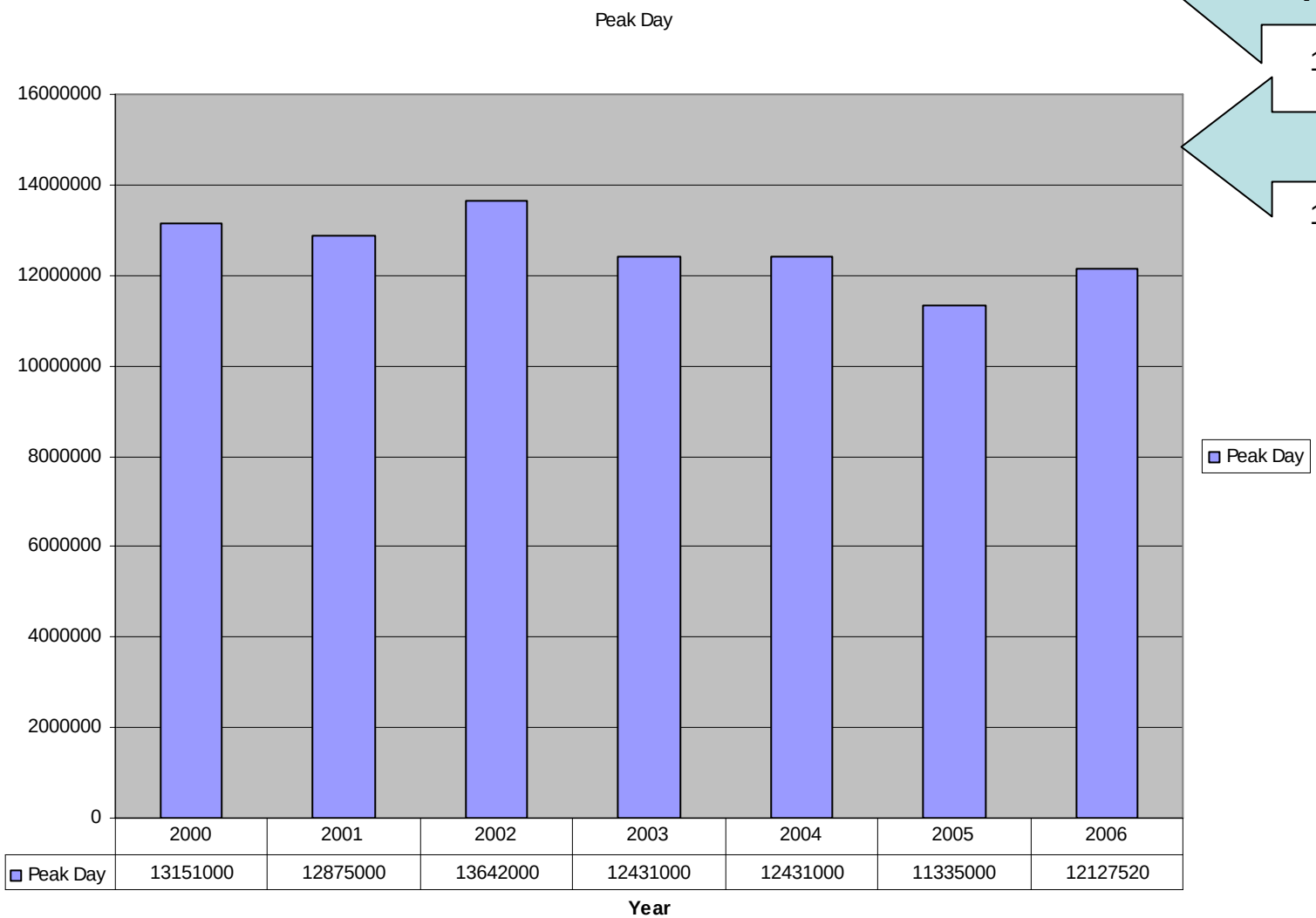
20 M.G.D

Warning

18 M.G.D.

Watch

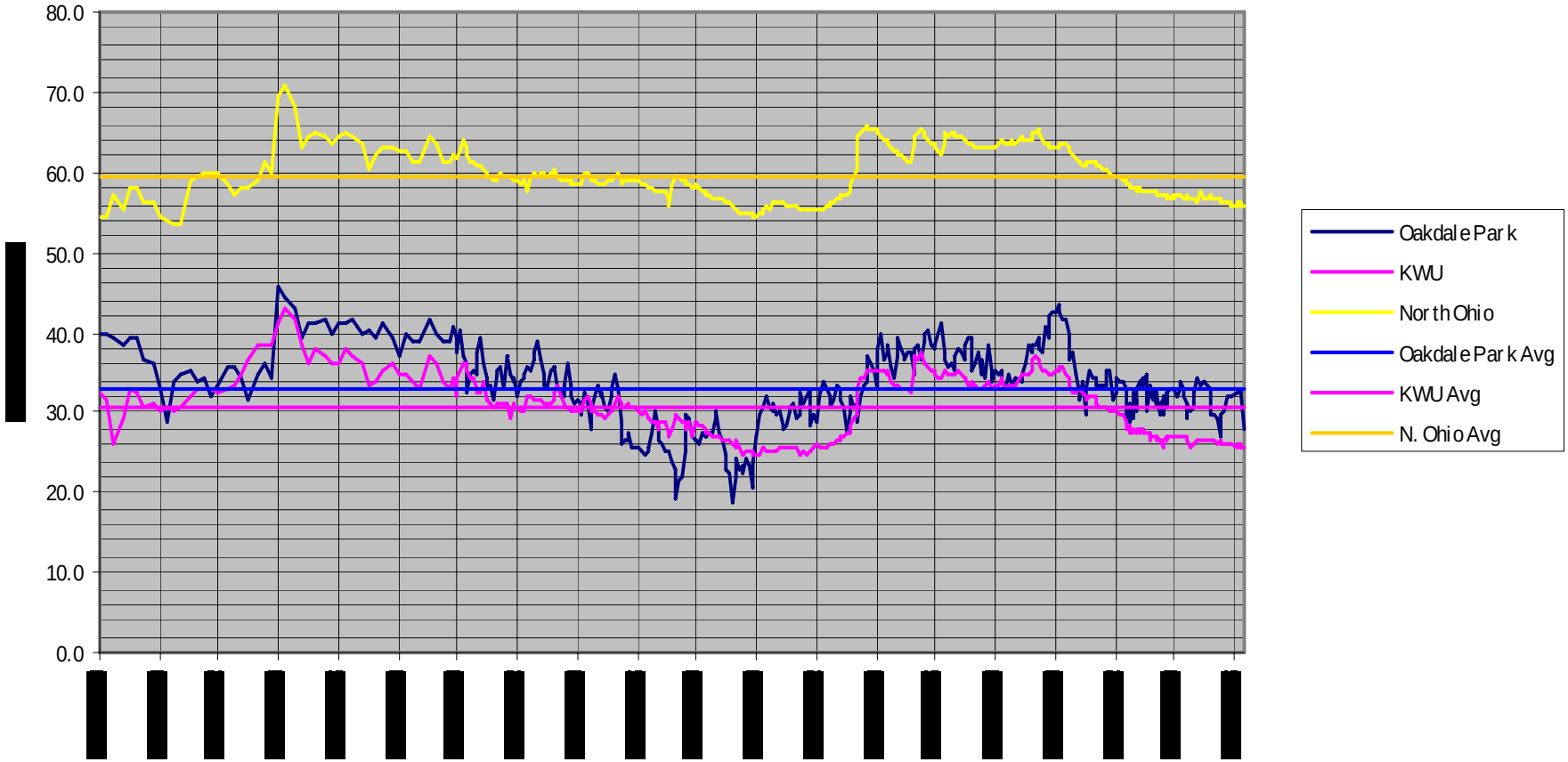
15 M.G.D



# Water Treatment Plant Capacity

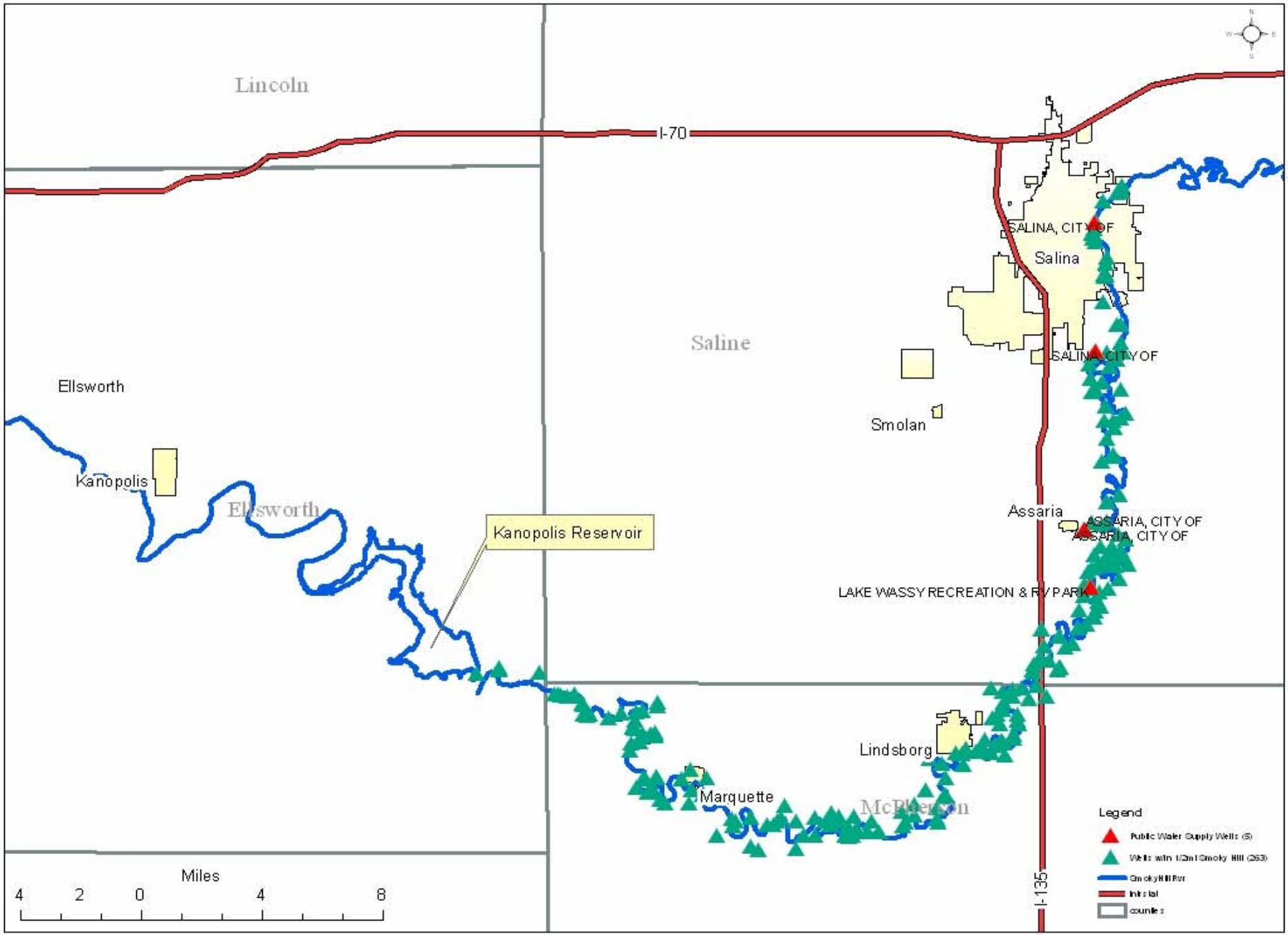
- The Treatment Plant Operation conditions, as defined in the Water Conservation Plan, have never been reached.
- The City of Salina peak daily demands have shown a steady decline since 2002. In 2002, the peak daily demand was 13.6 million gallons. In 2005, the peak daily demand was 11.3 million gallons. In 2006, the peak daily demand was 12.1 million gallons.
- Since our first Water Watch in 2002, total water consumption in Salina has continued to decline. In 2002, 2.7 billion gallons were consumed. In 2005, 2.4 billion gallons were consumed.

## Observation Wells



# Groundwater Levels

- Groundwater levels are calculated by city staff based upon measurement from normal seasonal levels.
- Normal seasonal levels are based upon the average of the three observation wells for the previous five years of measurements.
- Current status = 3 feet below normal 5 year seasonal levels.  In addition, the 40 year average = 4.6  feet.


Lincoln
I-70
Saline
Ellsworth
SALINA, CITY OF
Salina
SALINA, CITY OF
Smolan
Kanopolis
Ellsworth
Kanopolis Reservoir
Assaria
ASSARIA, CITY OF
ASSARIA, CITY OF
LAKE WASSY RECREATION & RV PARK
Lindsborg
Marquette
McPherson
I-135
Miles
4 2 0 4 8
Legend
Public Water Supply Wells (5)
Wells with 1/2mi Smoky Hill (253)
Smoky Hill Riv
Interstat
counties

# SMOKY HILL RIVER FLOWS

- Flows Measured at Mentor Gage Station (K-4 at Smoky Hill River)
- Flows Vary
  - Precipitation/Temperature
  - Peak irrigation demands along river
  - Peak city demands
  - Release From Kanopolis Reservoir
- City Intake Structure
  - Located at Bill Burke Park

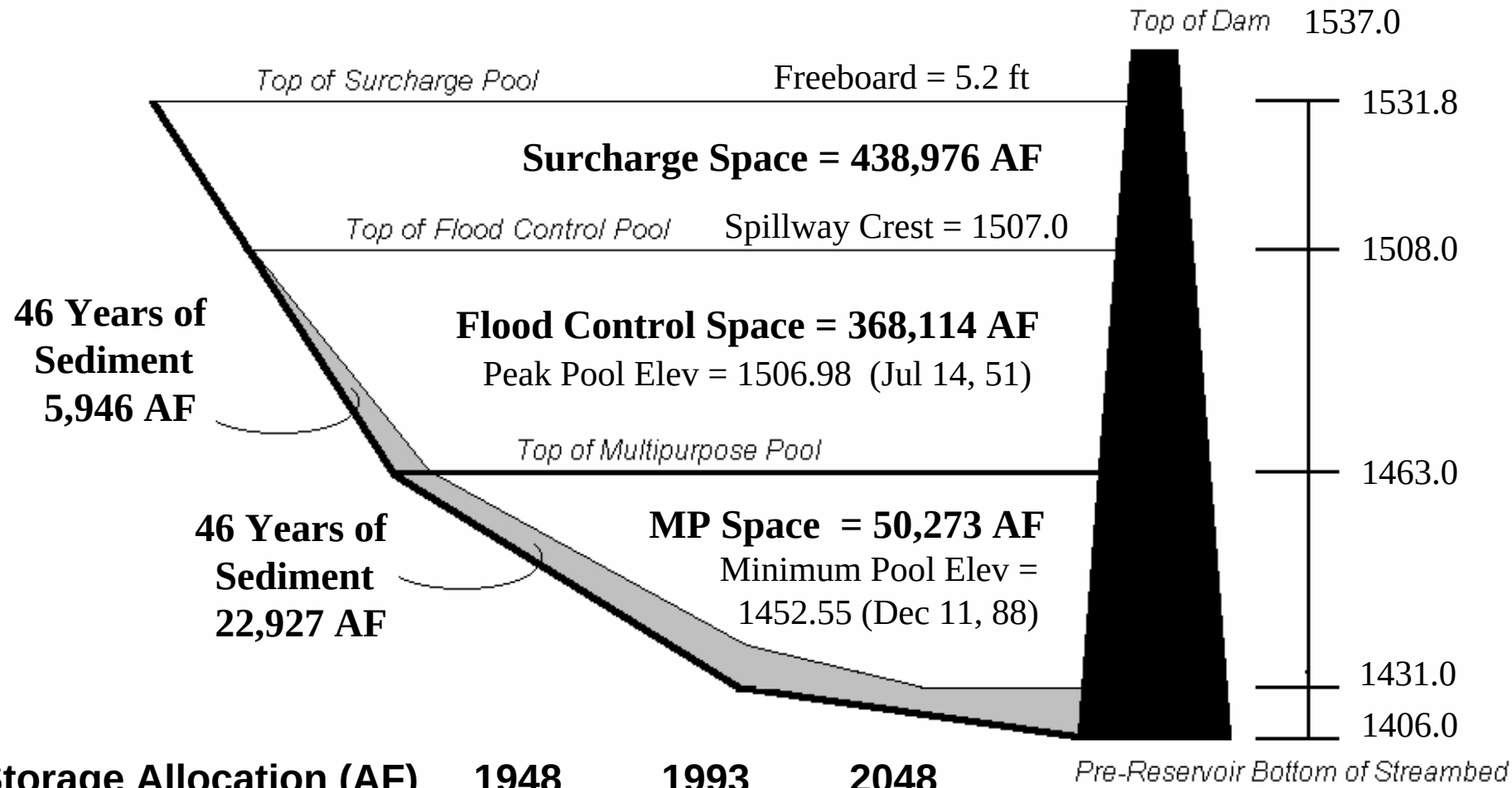
# Smoky Hill River Basin

- Discharge from Kanopolis Reservoir
- Approximately 80 water rights between Kanopolis and Salina
- Approximately 53 separate owners
- Approximately 10 water rights senior to Salina
- Water rights administered by Kansas Department of Agriculture, Division of Water Resources (DWR)

# Kanopolis Lake Storage Allocations

**Sediment Survey Last Conducted August 1993**

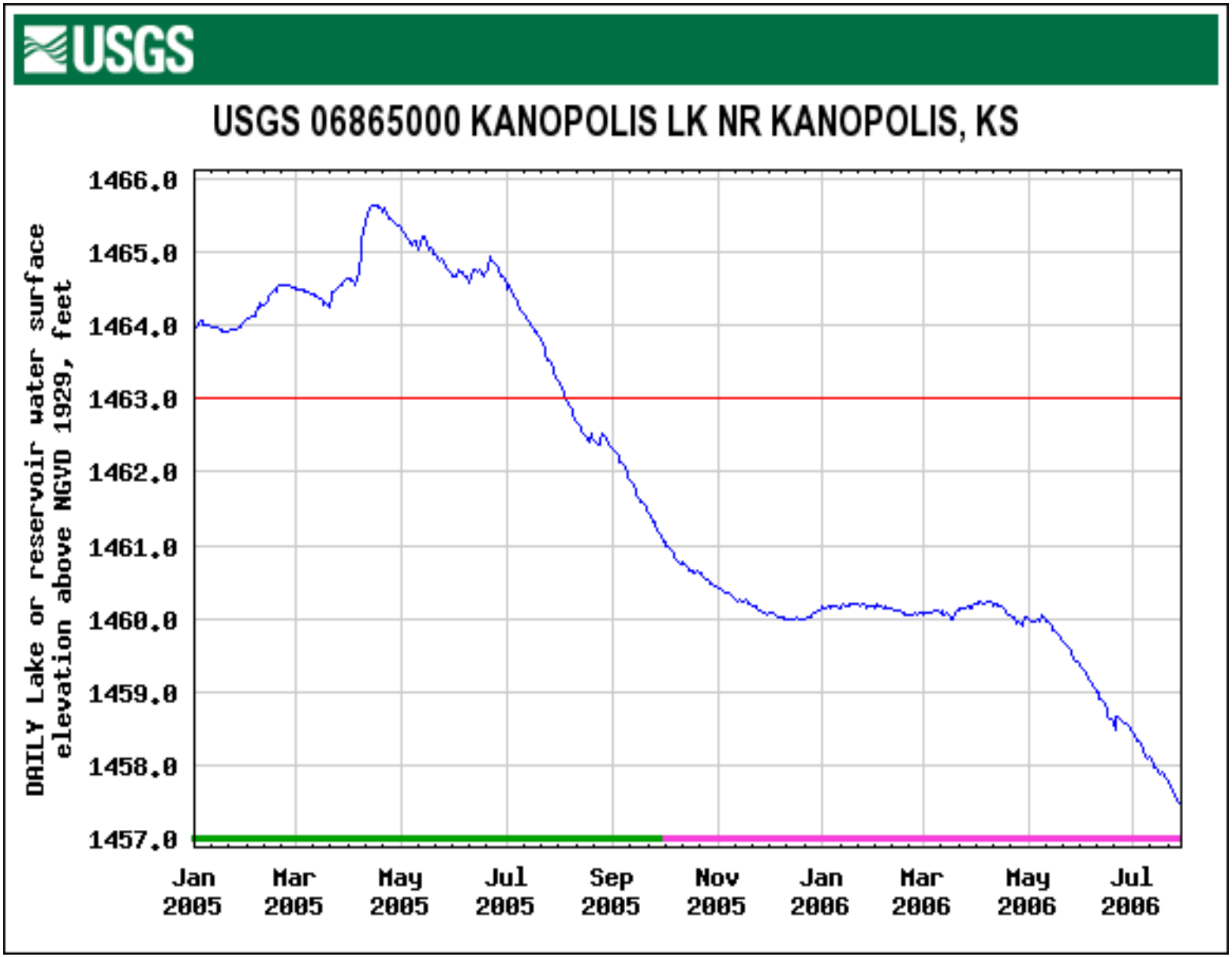
**Football field is slightly more than an acre**

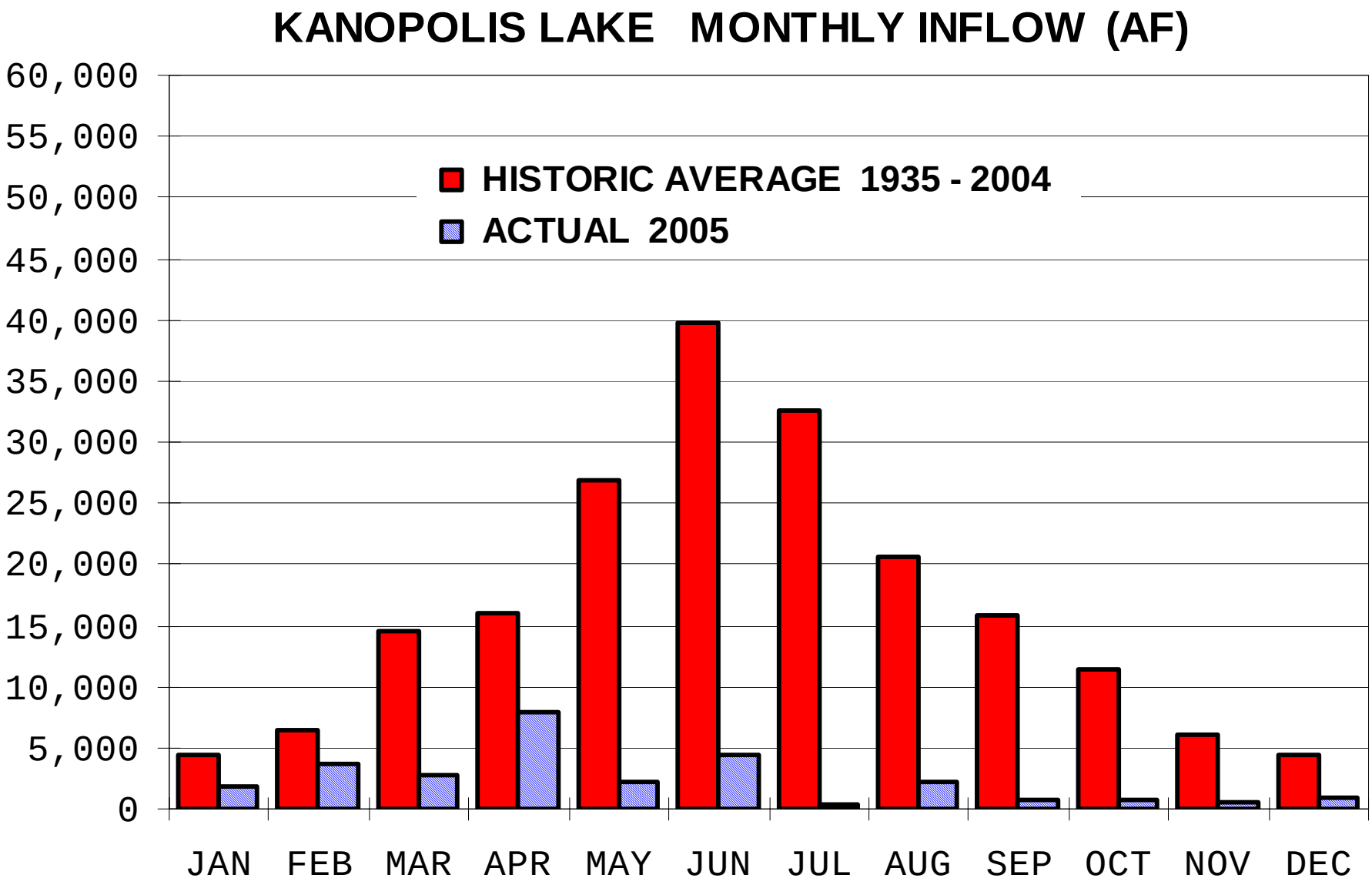


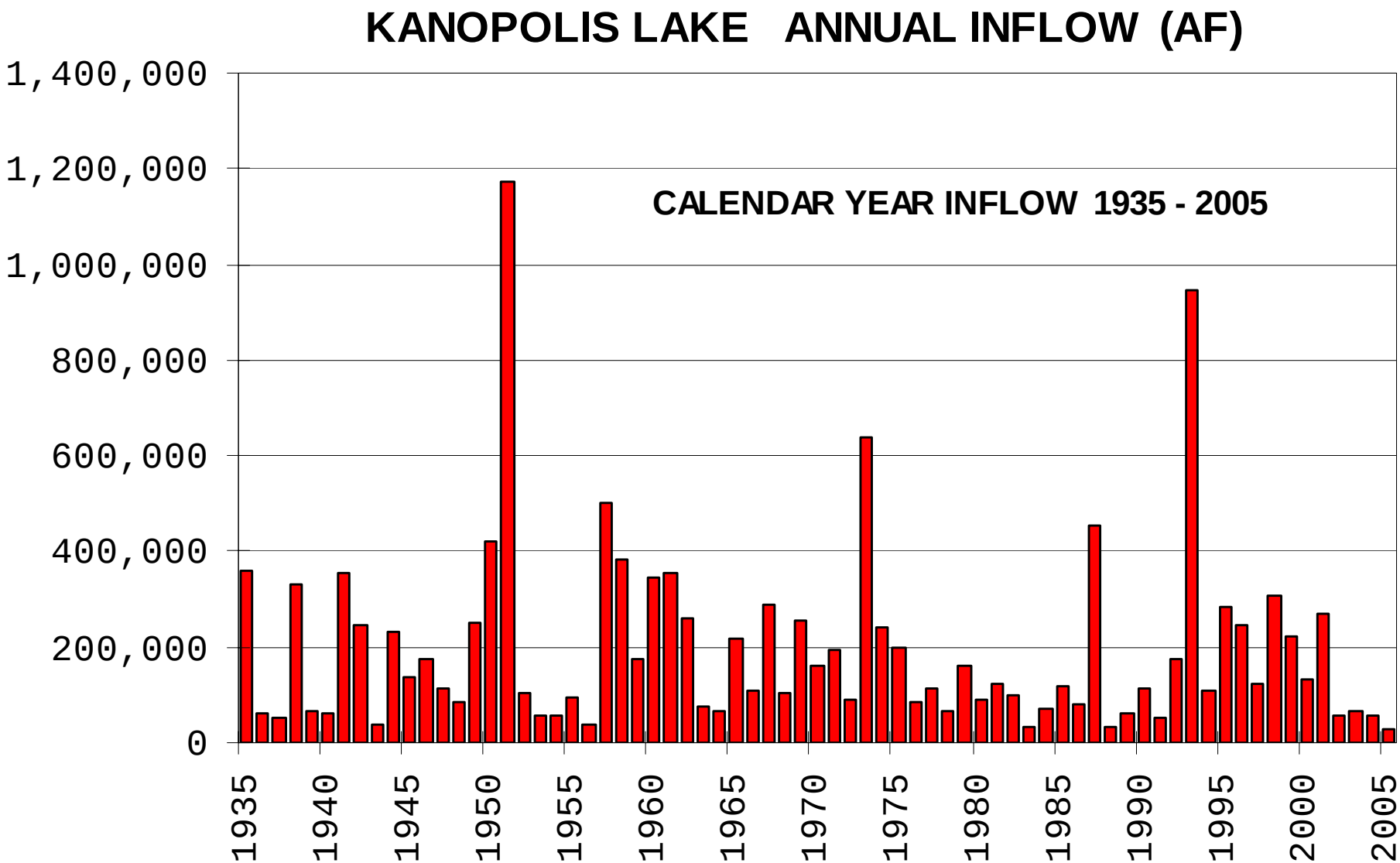

| Storage Allocation (AF) | 1948 | 1993 | 2048 |
|---|---|---|---|
| Flood Control | 374,060 | 368,114 | 362,254 |
| Multipurpose | 73,200 | 50,273 | 26,833 |

**Current level =1457.24**

**Storage = 32,970 (AF)**


USGS
USGS 06865000 KANOPOLIS LK NR KANOPOLIS, KS
DAILY Lake or reservoir water surface elevation above NGVD 1929, feet
1466.0
1465.0
1464.0
1463.0
1462.0
1461.0
1460.0
1459.0
1458.0
1457.0
Jan 2005
Mar 2005
May 2005
Jul 2005
Sep 2005
Nov 2005
Jan 2006
Mar 2006
May 2006
Jul 2006


KANOPOLIS LAKE MONTHLY INFLOW (AF)
60,000
55,000
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
HISTORIC AVERAGE 1935 - 2004
ACTUAL 2005
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC

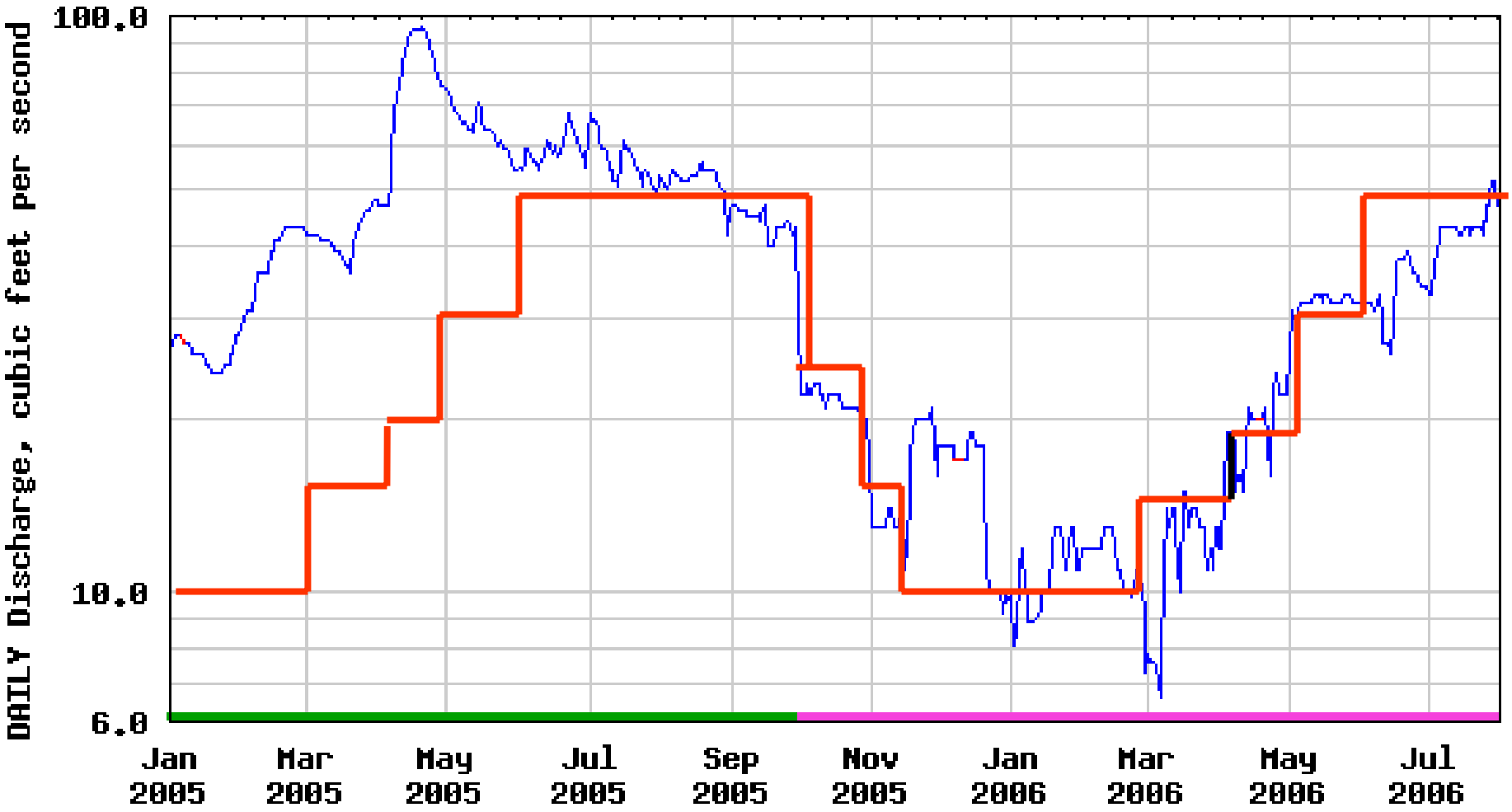

KANOPOLIS LAKE ANNUAL INFLOW (AF)
CALENDAR YEAR INFLOW 1935 - 2005
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005

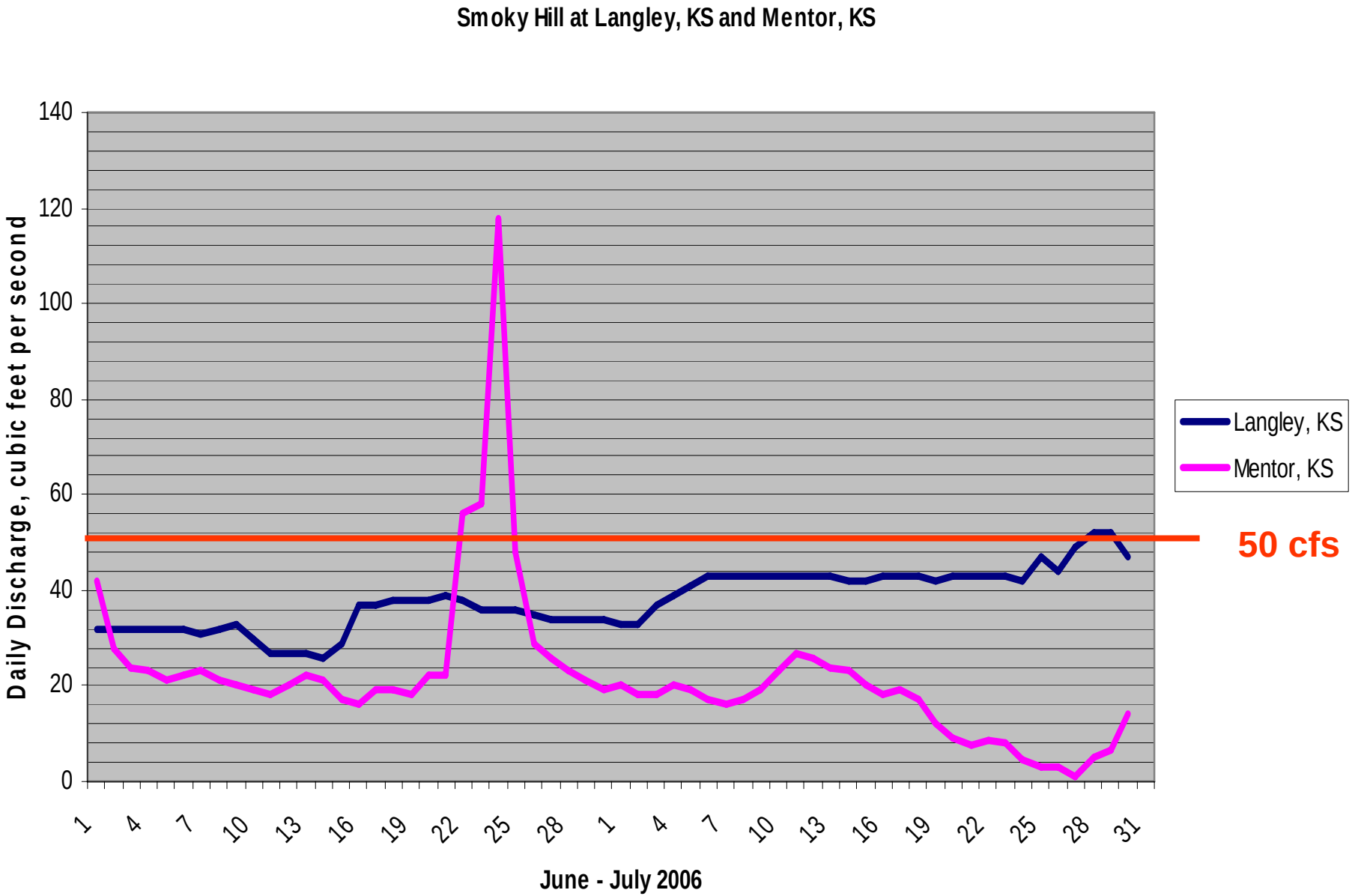
# Kanopolis Reservoir Minimum Release Criteria

| **Month** | **Kanopolis** |
|---|---|
| January – February | 10 cfs |
| March | 15 cfs |
| April | 20 cfs |
| May | 30 cfs |
| June - September | 50 cfs |
| October | 25 cfs |
| November | 15 cfs |
| December | 10 cfs |

USGS

# USGS 06865500 SMOKY HILL R NR LANGLEY, KS

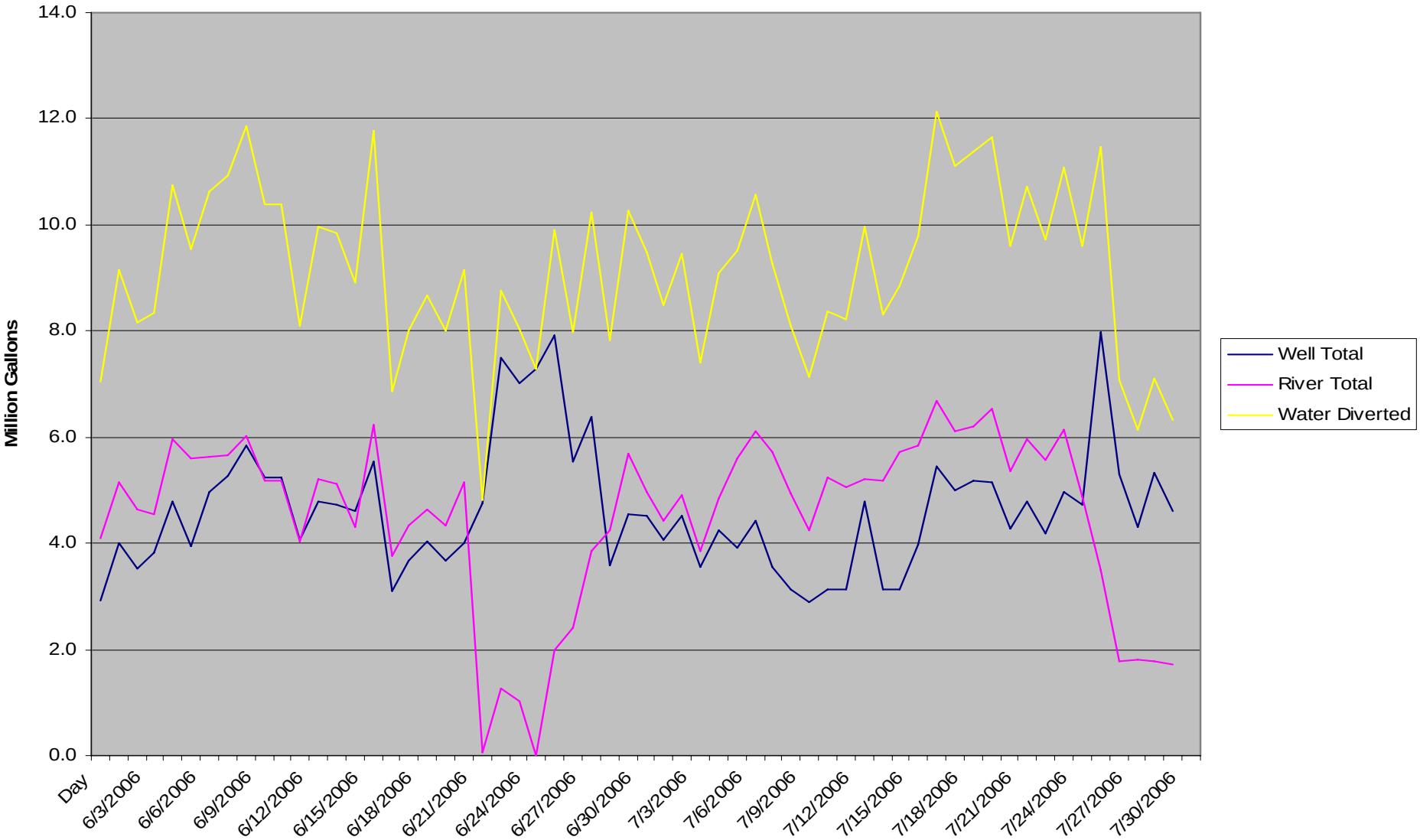



Smoky Hill at Langley, KS and Mentor, KS
Daily Discharge, cubic feet per second
140
120
100
80
60
40
20
0
1
4
7
10
13
16
19
22
25
28
1
4
7
10
13
16
19
22
25
28
31
June - July 2006
Langley, KS
Mentor, KS
50 cfs

# Kanopolis Lake Conditions

- Kanopolis Lake is nearly 6 feet below normal pool elevation.
- Kanopolis Lake has been below normal pool elevation since August 2005.
- Kanopolis Lake inflow appears to be at an all-time low.
- Kanopolis Lake minimum release criteria has not been consistently met in 2006.

# Water Consumption vs. Supply

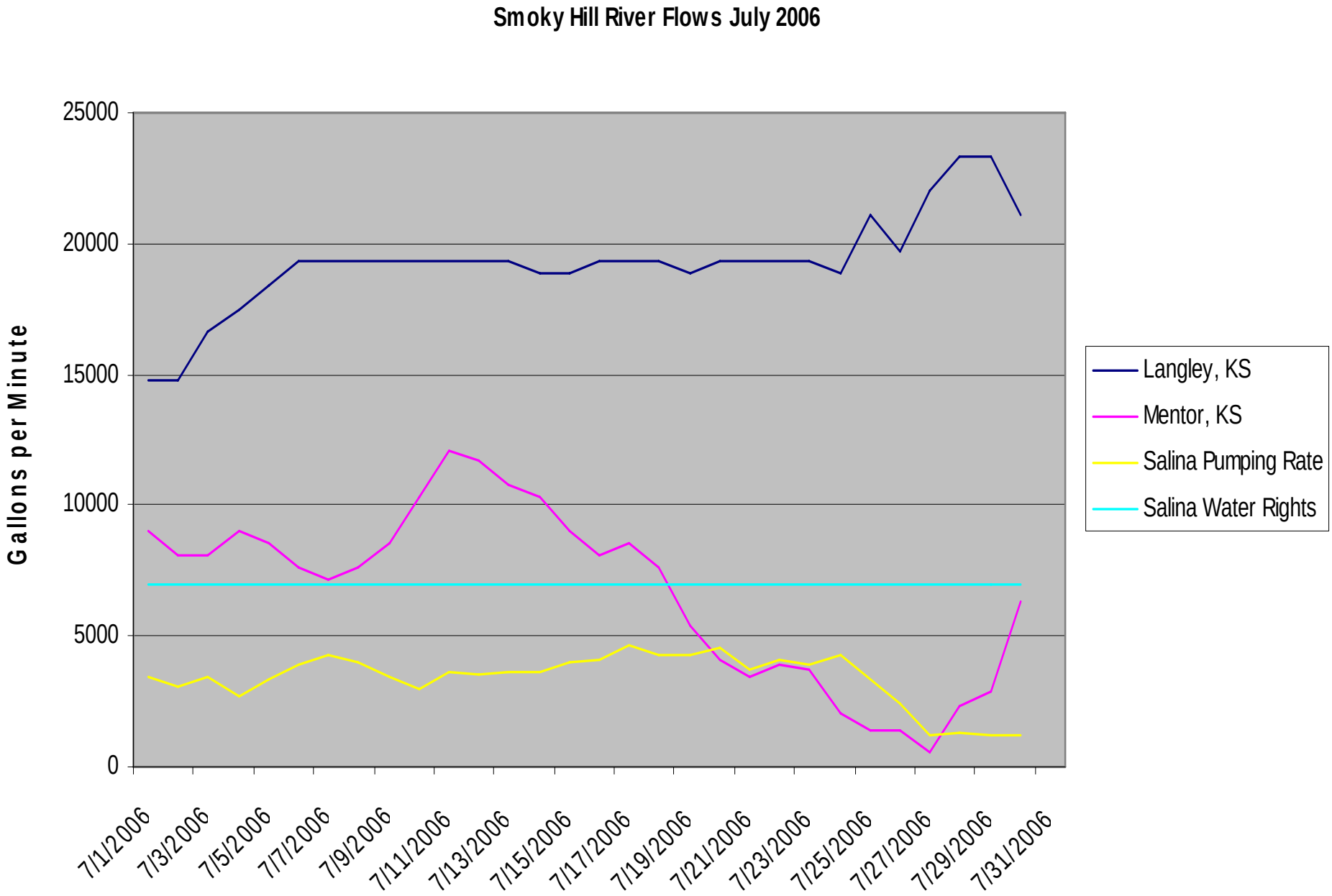


# Water System Load Balancing

- **Typical Summer Operation**
  - 60% Surface Water from the Smoky Hill River
  - 40% Groundwater from wells

- **River Water**
  - More cost effective to treat
  - Conserve groundwater levels
  - Comply with available water rights
  - Variable flow rates

- **Well Water**
  - More costly to treat (hardness)
  - Slow recharge rate
  - Long-term supply (slow change of groundwater levels)


Smoky Hill River Flows July 2006
Gallons per Minute
25000
20000
15000
10000
5000
0
7/1/2006
7/3/2006
7/5/2006
7/7/2006
7/9/2006
7/11/2006
7/13/2006
7/15/2006
7/17/2006
7/19/2006
7/21/2006
7/23/2006
7/25/2006
7/27/2006
7/29/2006
7/31/2006
Langley, KS
Mentor, KS
Salina Pumping Rate
Salina Water Rights

# Water Supply Emergency Restrictions

- No watering of grass
- Flowers, Plantings, and Vegetable Gardens 9:00p.m – 10:00a.m.
- No filling of pools
- No outdoor vehicle washing
- Commercial/Industrial owners allowed to meet City landscape ordinance
- No waste of water

# Conclusions

- Treatment Plant operations do not warrant “Water Watch” conditions.
- Groundwater levels do not warrant “Water Watch” conditions.
- Smoky Hill River levels are above “Water Emergency” status. (17 cfs at Mentor)
- Voluntary Water restrictions have proven to be ineffective in Salina.  Mandatory restrictions yield results.
- Recommend downgrading from “Water Supply Emergency” to “Water Warning”
- Recommend update of Municipal Water Conservation Plan.

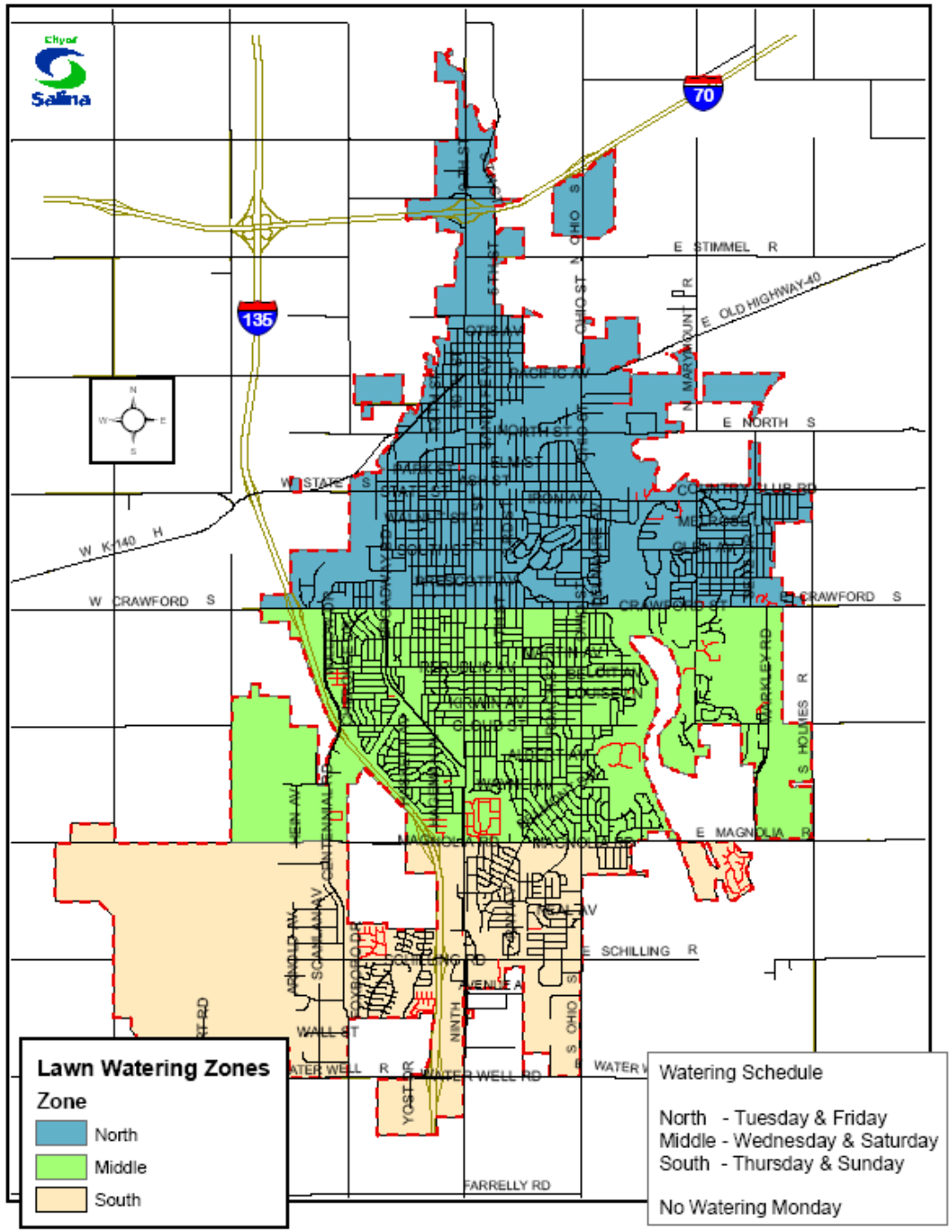
# Regional Water Consumption

## Gallons per person per day

| Public Water Supplier | GPCD |
|---|---|
| Derby (El Paso Water Co.) | 95 |
| Newton | 101 |
| Arkansas City | 120 |
| Salina | 123 |
| Topeka | 132 |
| Manhattan | 135 |
| Independence | 135 |
| Wichita | 136 |
| Winfield | 137 |
| Junction City | 147 |
| McPherson | 162 |
| Emporia | 170 |
| Coffeyville | 171 |
| El Dorado | 181 |
| **Average** | **139** |

# Water Warning Restrictions

- Three geographical regions for grass watering (9:00 p.m. – 10:00 a.m.)
- Filling of pools once per week
- Outdoor vehicle washing once per week
- City parks/facilities water reduction plan


City of Salina
70
135
E STIMMEL R
E OLD HIGHWAY-40
E NORTH S
W STATE S
W K-140 H
W CRAWFORD S
E CRAWFORD S
E MAGNOLIA R
E SCHILLING R
WALL ST
WATER WELL RD
FARRELLY RD
S HOLMES R
Lawn Watering Zones
Zone
North
Middle
South
Watering Schedule
North - Tuesday & Friday
Middle - Wednesday & Saturday
South - Thursday & Sunday
No Watering Monday